Apparatus and Computer Program for Practicing Musical Instrument
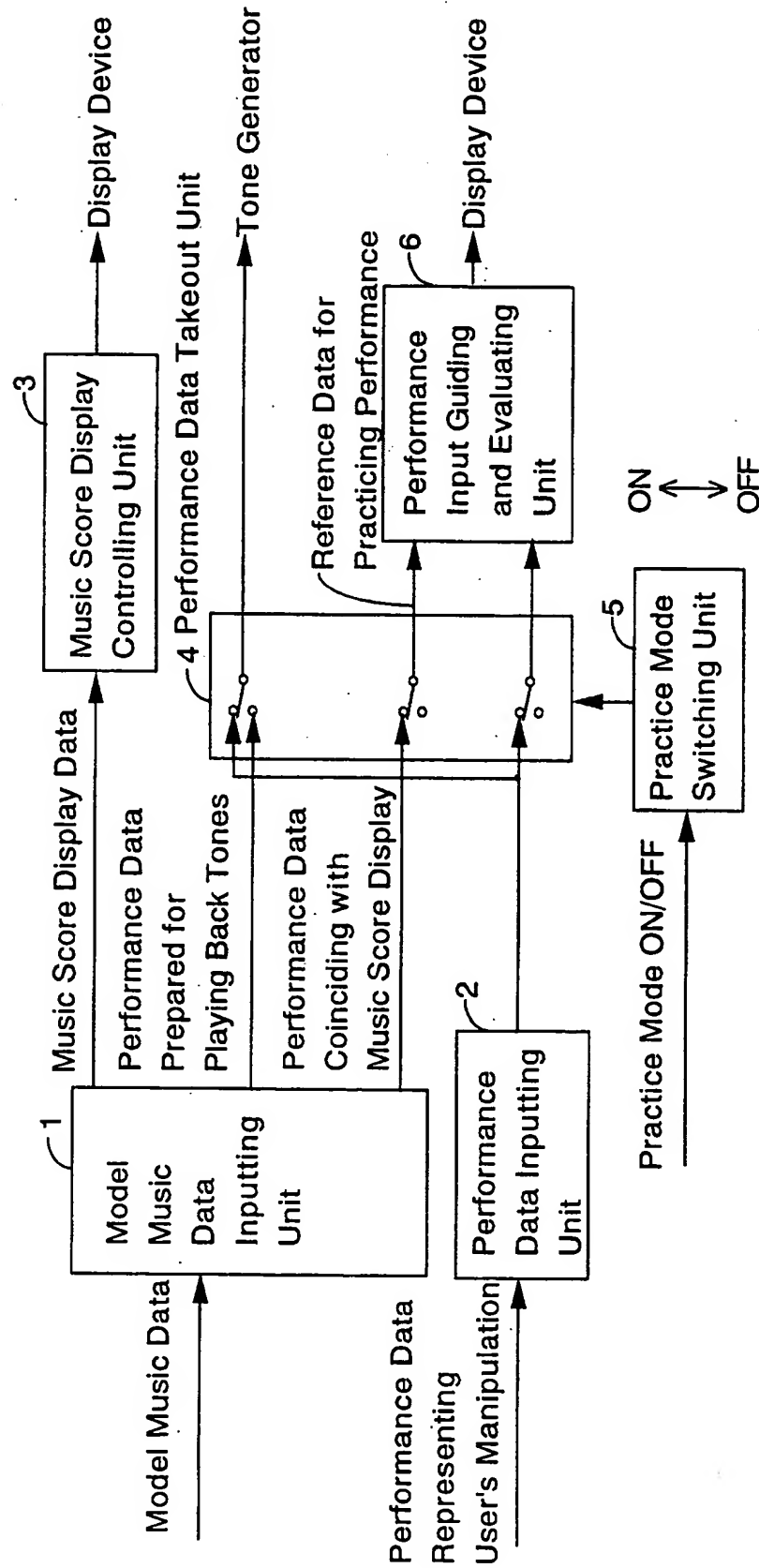Satoshi Hiratsuka et al.
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Fig. 1   Functional Configration

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Fig.2   Model Music Data Structure

Musical Data for Display	Music Score Display Data (Staves, Measures, Notes, Rests)
	Other Display Data (Words, Chords, etc.)
Reference Data for Practicing Performance	Performance Data Coinciding with Music Score Display (of Practice Part)
Performance Data for Playing Back Tones	Performance Data Prepared for Playing Back Tones (of Practice Part)
	Performance Data Prepared for Playing Back Tones (of Non-Practice Part)

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Fig.3a Performance Data List

(with Practice Mode Off)

No.	Performance Data
1	Performance Data Prepared for Playing Back Tones of Practice Part #1
2	Performance Data Prepared for Playing Back Tones of Practice Part #2
3	Performance Data Prepared for Playing Back Tones of Part #a Other than Practice Parts
4	Performance Data Prepared for Playing Back Tones of Part #b Other than Practice Parts
5	Performance Data Prepared for Playing Back Tones of Part #c Other than Practice Parts
...	....

Fig.3b Performance Data List

(with Practice Mode On)

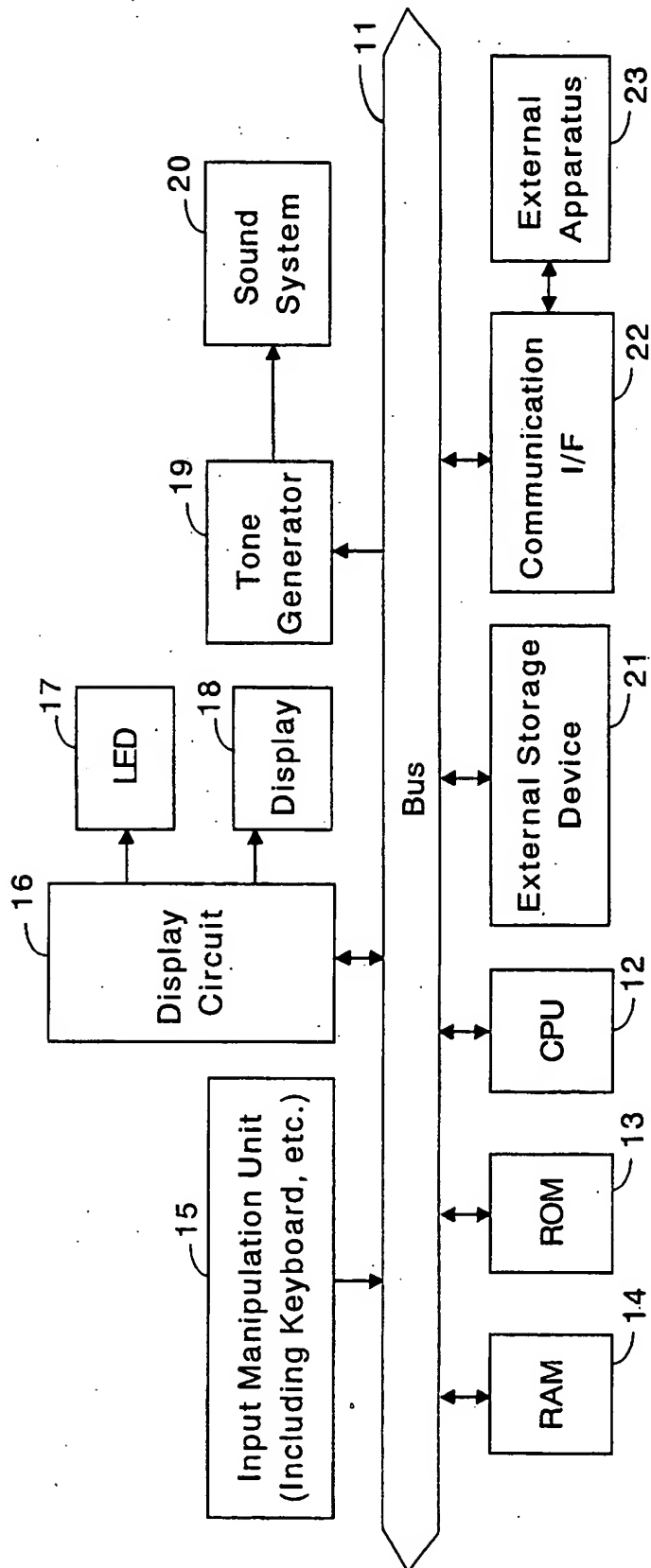| No.	Performance Data
1	Performance Data Coinciding with Music Score Display of Practice Part #1
2	Performance Data Coinciding with Music Score Display of Practice Part #2
3	Performance Data Prepared for Playing Back Tones of Part #a Other than Practice Parts
4	Performance Data Prepared for Playing Back Tones of Part #b Other than Practice Parts
5	Performance Data Prepared for Playing Back Tones of Part #c Other than Practice Parts
...	....

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Fig. 4 Hardware Configuration

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Fig. 5a Processing Flow (Part 1)

```
                    ┌─────────────────────────┐
                    │          Start          │
                    └─────────────────────────┘
                                 │         S31
                    ┌─────────────────────────┐
                    │    Select Model Music    │
                    │   Piece and Read Music   │
                    │           Data           │
                    └─────────────────────────┘
                                 │         S32
                    ┌─────────────────────────┐
                    │      Initially Set       │
                    │    Performance Data      │
                    │   Prepared for Playing   │
                    │    Back Tones into       │
                    │  Performance Data List   │
                    └─────────────────────────┘
                                 │         S33
                    ╱───────────────────────╲   NO
                   ⟨     Practice Mode        ⟩──────────┐
                    ╲     Demanded ?         ╱           │
                     ╲─────────────────────╱            │
                          │ YES    S34                   │  S35
          ┌─────────────────────────┐      ┌─────────────────────────┐
          │  ( In Case There Are    │      │ ( In Case Performance Data│
          │  Plural Practice Parts  │      │  List Is Not of Initially Set│
          │ Selectable )  Designate │      │    Contents )  Change     │
          │     Practice Part       │      │    Performance Data       │
          └─────────────────────────┘      │   Coinciding with Music   │
                          │        S36      │  Score Display of Practice│
          ┌─────────────────────────┐      │  Part in Performance Data │
          │    With Respect to       │      │  List to Performance Data │
          │ ( Designated )  Practice │      │ Prepared for Playing Back │
          │     Part, Change         │      │   Tones of Practice Part  │
          │  Performance Data in     │      └─────────────────────────┘
          │  Performance Data List   │                  │
          │   to Performance Data    │         Prepared for
          │  Coinciding with Music   │         Ordinary Playback
          │     Score Display        │
          └─────────────────────────┘
                          │   Prepared for
                          │   Practice
   (C) (D)               (A)                           (B)
```

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Fig. 5b Processing Flow (Part 2)

C D A B

S37
Display Music Score

S39
Display Music Score

Practicing S38

Playing Back
Tones S40

Using Performance Data of
Practice Part in
Performance Data List as
Reference Data for
Practicing Performance,
Display Notes (Pitches and
Durations) to Be Played
Visually for User and
Compare Notes Played by
User Therewith for
Evaluation
(Performance Data
Prepared for Playing Back
Tones of Parts Other than
Practice Parts in
Performance Data List May
Be Played Back in Tones
Along with Progression of
Practice)

Tone Generator Plays
Back Tones According to
Performance Data in
Performance Data List
(All Performance Data in
Performance Data List
Are Set to Be
Performance Data
Prepared for Playing Back
Tones)

NO S41
Model Music Piece
to Be Changed?

YES

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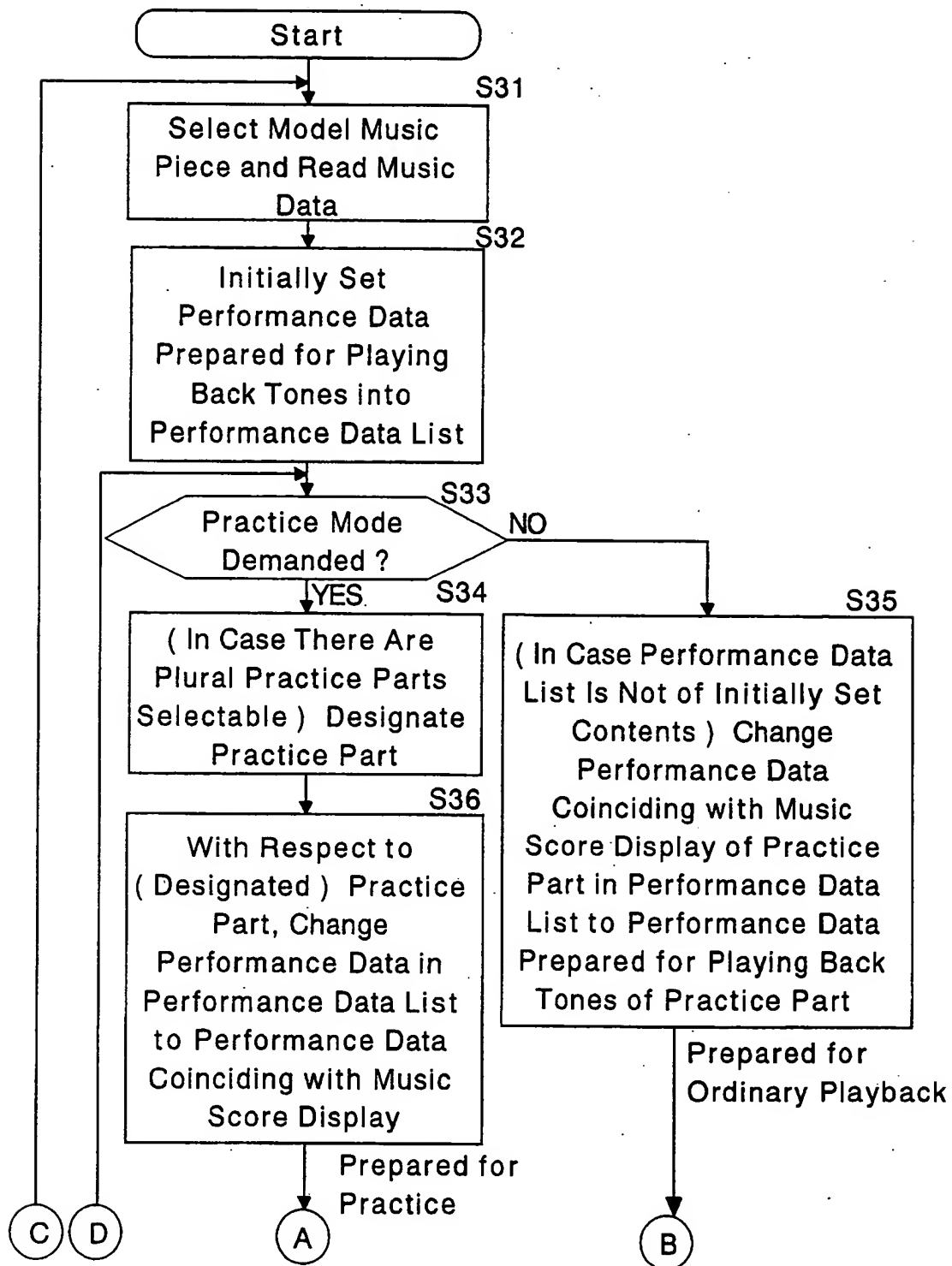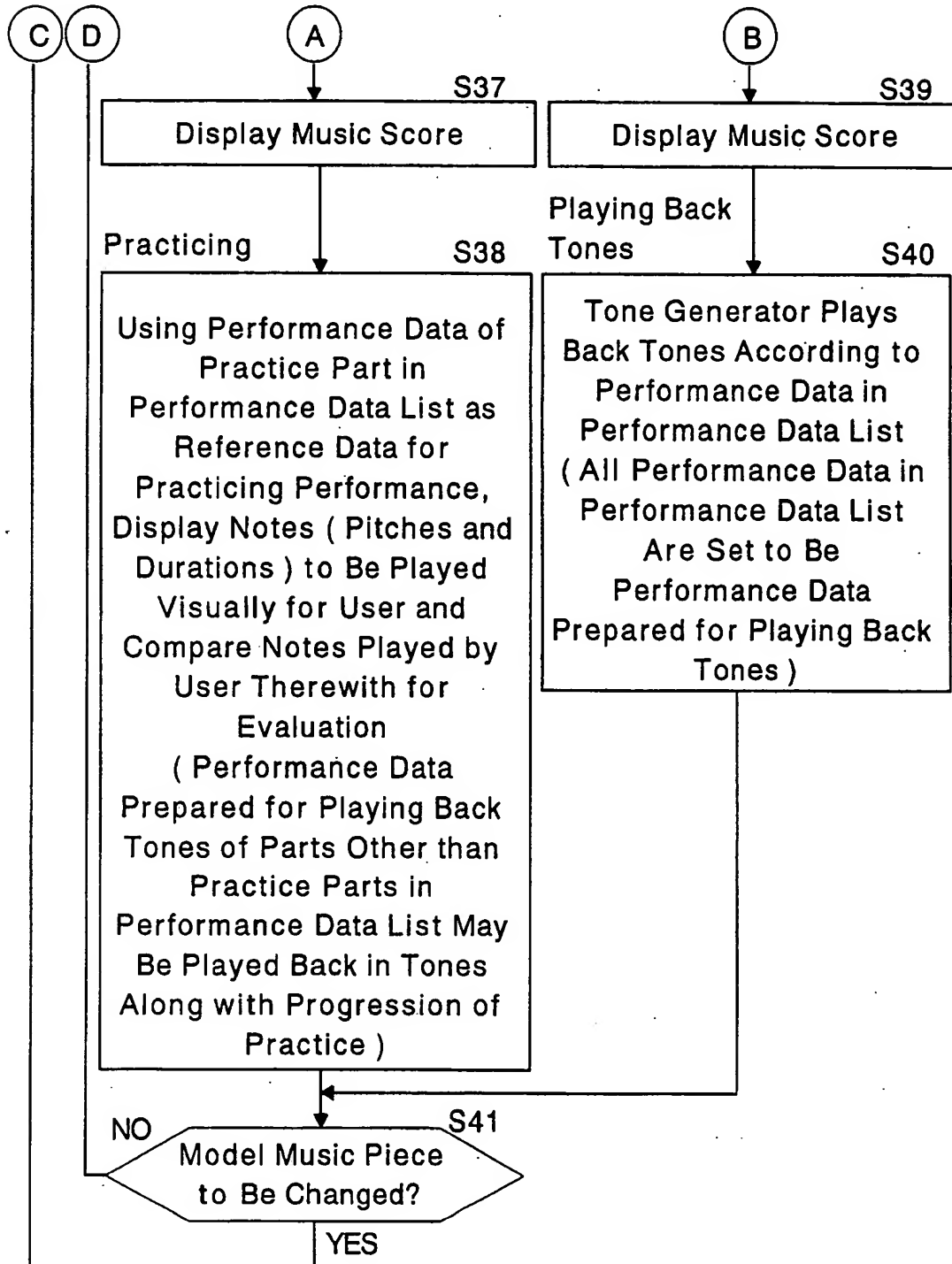*Fig.6* Relation between Note and
Performance Data
(in example Where Performance
Data Prepared for Playing Back Tone
Comes a Bit Earlier than Timing of
Note as Displayed)

Eighth Note Displayed
at Top of Measure

(a)

(b)   Performance Data
Coinciding with Music Score

(c)   Performance Data Prepared
for Playing Back Tones

Preceding Beat   Bar Line   Next Beat